

What Works: Reducing Energy Waste in Your Residence

What follows is a summary of an analysis by Michael Blasnik of energy savings program results from across the country over the last 20+ years, supplemented with data from Illinois utilities provided by the author. (Blasnik, M. "Prioritizing Energy Savings: What's Important" ACI Conference 2008, Pittsburgh, PA). This is the most complete of all the savings studies we have read. Blasnik finds that savings measured in the field are typically about 40% below the savings predicted by computer modeling and that rough estimates can work as well or better.

Where is Energy Waste the Greatest in the U.S.?

The state you live in affects the average waste per residence because some states are leaders in energy efficiency and many are not. California, New York, and Wisconsin are among the leaders; while Illinois, Michigan, Alabama, and Tennessee are among the worst energy hogs.

In cold climates, the average natural gas usage per residence is 700 - 950 therms/yr. The Illinois average is 1028 therms/yr, which is high among cold climate states. **However, Chicago taken alone is even worse:** North Shore Gas customers use 1366 therms/yr (for 2005), Peoples 1207, and Nicor 1142.

Electric usage varies widely, unlike gas usage, and depends on end uses. In cold climates, 9000 kWh per residence is high; in hot climates with electric hot water it is low. Illinois's average is 9000+ kWh.

Most residents of the Chicago area have considerable energy waste waiting to be stopped!

What does it Cost to Stop Waste?

The more energy you waste in your residence, the greater the opportunities for savings you have. Spending on energy retrofits increases with high energy users; however, their spending per dollar stops more waste. The cost per therm to stop energy waste ranged from \$4 in homes with high energy use to \$22 in homes with lower energy use. One therm costs about \$1.00.

Clues that You Have Energy Waste:

1. **Energy Usage is high?**
2. **Big House?**
3. **Lack of efficiency measures**, such as uninsulated walls and attics?
4. **Inefficient equipment**, such as heating system, refrigerator?
5. **Extra stuff**, such as 2nd refrigerator or freezer, humidifier, all night outdoor lighting?
6. **Defects**, such as duct leakage in attic or crawl; thermal/pressure boundary –air leaks at knee walls, holes from the house into the attic or basement, split-level attic; hot water leaks?
7. **Behavior**, such as high thermostat settings and lack of setback; and leaving stuff on 24 hr/day: lights, computers, TVs, ceiling fans, furnace fans?

Blasnik's Recommendation: Find Problems and Turn Off, Fix, or Replace to Stop Waste

Building Shell

- Insulate uninsulated walls and attics! Save about 0.2 therms/sq.ft./yr in heating climates
- Air seal leaky homes! This is the "low hanging fruit" of energy savings; use a blower door

Heating and Cooling (HVAC)

- Turn down thermostat and/or use setback
- Seal ducts in attics, crawl spaces, attached garages – duct leaks waste 8% - 20% of heat produced by equipment – savings highest for attics, lower for crawl spaces
- Replace inefficient heating systems with 92%+ if high usage or ready to replace anyway
- Replace very old, high usage air conditioners only

Hot Water

- Fix hot water leaks – tremendous savings potential when found
- High efficiency clothes washer—OR wash clothes in cold water more often
- Very low flow showerheads

Things That Work if Diagnosed

- Advanced air sealing, strategic dense packing (cellulose) and other work based on diagnostic energy surveys – often addresses comfort, moisture, IAQ & other problems beyond energy use
- Air conditioner commissioning/ tune up IF done by a very knowledgeable HVAC contractor and includes measure of charge and of air flow & IF a big cooling load
- Duct balancing/pressure relief – more common problem in tighter new homes

Electric Base Load

- Replace inefficient refrigerator
- Lighting – CFLs, fluorescent fixtures, and motion detectors
- Remove/unplug/shut off unneeded stuff – furnace fans, freezers, lights, etc.

Things that Don't Save Enough

- Window replacements – Blasnik finds 100+ yr payback is typical
- Routine weather-stripping and caulking
- Floor Insulation
- Heating System Tune-Ups
- Basement Duct Sealing (unless big holes in ducts or there is a health and safety problem)
- Water Heater Replacements
- Behavior changes with trivial impacts, e.g., clean fridge coils, cook with lids on pots

Priorities

1. Find and fix health, safety, IAQ, structural problems –utility savings may also be achieved, though secondary to merit of solving the primary problem
2. Don't make things worse – don't air seal or insulate without health & safety protocols
3. Saving a lot of energy – start with the most cost-effective thing first!

A rule of thumb is that energy waste stopped by typical weatherization retrofits is equal to the highest winter bill (or about 20% of yearly use), but is greater in higher energy use homes.